

CLAIMS:

- 5 1. A safety device, the safety device incorporating a force limiter to permit the restricted paying out of a safety belt with the absorption of energy, the force limiter having a first relatively high energy absorbing level and a second relatively low energy absorbing level, there being a first mechanism operable to select one said energy absorbing level in response to a crash related electric
10 signal, there being a mechanical arrangement, responsive to a relative movement between two components of the safety device caused by an initial belt force in excess of a predetermined force, the mechanical arrangement directly inhibiting the effective selection of the one said energy absorbing level by the first mechanism.
- 15 2. A device according to Claim 1 wherein the first mechanism is operable to select the second relatively low energy absorbing level and the said arrangement responsive to an initial belt force is operative to inhibit effective selection of the said second relatively low energy absorbing level.
- 20 3. A device according to Claim 1 in the form of a seat belt retractor.
4. A device according to Claim 3 wherein the arrangement includes a two-part spindle within the retractor, a first part of the spindle being adapted to be
25 locked, a second part of the spindle having the safety belt wound around it, the arrangement being such that the second part of the spindle may move relative to the first part when the initial belt force in excess of said predetermined force applied, the movement of the second part of the spindle relative to the fixed

first part of the spindle actuating the arrangements which inhibits said one of said energy levels.

5. A device according to Claim 4 wherein the second part of the spindle is
5 connected to the first part of the spindle by means of an energy absorbing
torsion bar, the energy absorbing torsion bar having two sections, a first section
being operative to provide said first relatively high energy absorbing level and a
second section being operative to provide said second relatively low energy
absorbing level.

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6. A device according to Claim 5 wherein the said mechanism incorporates
a locking element and an inhibiting element, the inhibiting element engaging
part of the torsion bar between the first and the second section thereof, the
locking element initially engaging part of the inhibiting element and the second
15 part of the spindle to secure the said inhibiting element to the second part of the
spindle, the locking element being moveable to a release position in which the
locking element does not secure the inhibiting element to the second part of the
spindle.

20 7. A device according to Claim 6 wherein the locking element is a radially
moveable locking element, the locking element initially being retained in an
engaged position by means of a blocking element located adjacent one end of
the locking element, the said mechanism being configured to move said
blocking element to a release position in response to said crash related electric
25 signal.

8. A device according to Claim 7 wherein the blocking element is in the
form of a ring.

9. A device according to Claim 7 or Claim 8 wherein the blocking element is moveable in response to the generation of gas by a pyrotechnic squib.

5 10. A device according to Claim 9 wherein the pyrotechnic squib is positioned to direct gas directly to the blocking member.

11. A device according to Claim 9 wherein there is a control element, the squib being positioned to direct gas to the control element to move the control
10 element so that the movement of the control element moves the blocking element to the release position.

12. A device according to any one the Claims 9 to 11 wherein the pyrotechnic squib is associated with at least one gas duct formed in the first part
15 of the spindle and at least one gas duct in the second part of the spindle, the said two gas ducts initially being co-aligned, so that a flow of gas may flow through both gas ducts to cause movement of the blocking element, the first part of the spindle being moveable relative to the second part of the spindle in response to said initial belt force in excess of a predetermined value, thus off-
20 setting the gas flow ducts to prevent the flow of gas.

13. A device according to Claim 12 wherein there are a plurality of said gas ducts in the first part of the spindle and a corresponding plurality of said gas flow ducts in the second part of the spindle.

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14. A device according to any one of Claims 7 to 11 wherein the blocking element is located adjacent a stop, the blocking element in one orientation being moveable past the stop, the blocking element, in any other orientation, not being moveable past the stop, the orientation of the blocking element being

mounted to the second part of the spindle to be moveable with the second part of the spindle.

15. A device according to Claim 14 wherein the blocking element is in the form of a ring, the ring being provided with at least one inwardly directed finger, the finger being received within an axially extending groove formed in an outer region of the second part of the spindle.

16. A device according to Claim 14 or Claim 15 wherein the stop is formed on the first part of the spindle.

17. A device according to any one of Claims 14 to 15 wherein two diametrically opposed stops are provided, each of a predetermined configuration, and the ring shaped blocking element is provided with two cut-outs of corresponding shape and configuration.

18. A device according to any one of Claims 4 to 11 wherein wires are provided to supply said electric signal, a part of at least one wire extending from the first part of the spindle to the second part of the spindle, the said part of the wire being configured to be broken on relative movement of the second part of the spindle relative to the first part.

19. A device according to any one Claims 6 to 11 wherein the inhibiting element is provided with a deformable portion which is configured to be deformed in response to relative movement of the second part of the spindle to a first part of the spindle, the deformable part being positioned to co-operate with a correspondingly configured part of the second part of the spindle, to engage the deformable part with the second part of the spindle so as to inhibit effective selection of said one of said energy levels.

20. A device according to Claim 19 wherein the deformable part is in the form of a deformable finger, the finger being deformed into a shaped recess provided within part of the second part of the spindle.